

# Genetic Improvement of Energy Usage is only as Reliable as the Measurements are Accurate

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# Position

*“If you can not measure it, you can not improve it.”*

– Lord Kelvin

*If you can not measure it **accurately**, you can not improve it **reliably**.*

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# Issues that need addressing

- Physical measurements
- Measuring software consumption
- Scale

1



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<sup>1</sup> Image courtesy of hin255 at FreeDigitalPhotos.net

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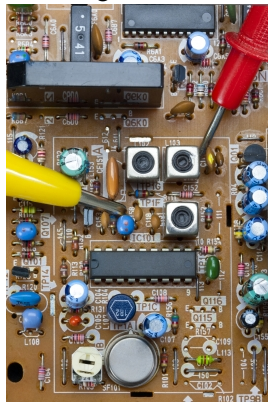
# Physical measurements

Electricity as the current drawn and voltage over time.

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2



# Physical measurements

Electricity as the current drawn and voltage over time.

- 1 Works well in development and labs
- 2 Does not transfer well to the general public consumer.



2

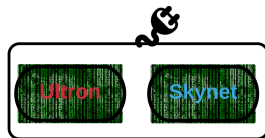
# Measuring software consumption

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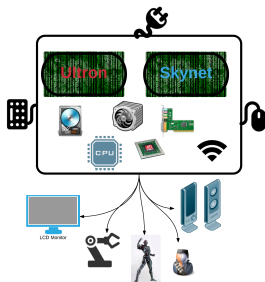
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# Measuring software consumption

- Programs do not have wired connections that we can monitor.
- Run on devices alongside other programs.
- And use multiple components, internal and external.



# Scale

- Should we be concerned for personal electronics?



# Scale

- Should we be concerned for personal electronics?
- ... or just focus on larger scale projects?



# Scale

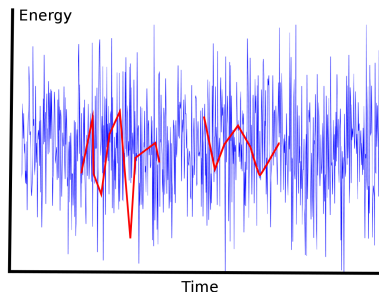
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- ... or just focus on larger scale projects?
- The difference in consumption is huge



# Scale

- Should we be concerned for personal electronics?
- ... or just focus on larger scale projects?
- The difference in consumption is huge
- ... and the amount consumed by a single software could disappear in measurement uncertainty.

3





# Thanks for listening

**Now lets discuss!**  
**Any comments or questions?**